

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
21 June 2001 (21.06.2001)

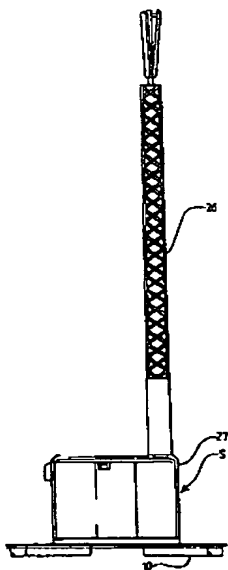
PCT

(10) International Publication Number  
**WO 01/44585 A1**

- (51) International Patent Classification<sup>7</sup>: E02D 27/01, (74) Agent: FORRESTER KETLEY & CO; Chamberlain House, Paradise Place, Birmingham B3 3HP (GB).  
E04H 5/02, H01Q 1/12
- (21) International Application Number: PCT/GB00/04846 (81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.
- (22) International Filing Date:  
18 December 2000 (18.12.2000)
- (25) Filing Language: English
- (26) Publication Language: English (84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).
- (30) Priority Data:  
9929862.2 18 December 1999 (18.12.1999) GB  
0030215.8 12 December 2000 (12.12.2000) GB  
0030217.4 12 December 2000 (12.12.2000) GB
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- Published:  
— With international search report.  
— Before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments.
- For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: FOUNDATION

(57) Abstract: A foundation comprising at least one prefabricated foundation element (10).



WO 01/44585 A1

Title: Foundation

Description of Invention

The present invention relates to a foundation, particularly but not exclusively for an aerial mast.

An aerial mast, comprising an upstanding mast part having communication means for receiving and/or transmitting electromagnetic signals such as analogue and/or digital radio signals and/or microwave signals at or adjacent the top of the mast part, requires operating equipment which comprises, for example, a transceiver system and a power supply system. The operating equipment is contained in an equipment housing which may be separate from or attached to the mast part. To maintain the mast and/or equipment housing in place particularly against wind loading, it is necessary to provide a foundation. Conventionally, this foundation comprises one or more poured concrete slabs to which the mast and/or equipment housing is attached. The preparation of a such foundation represents a significant element of the time and expense involved setting up an aerial mast.

An aim of the present invention is to provide a new or improved foundation.

According to one aspect of the invention, we provide a foundation comprising at least one prefabricated foundation element.

Said foundation element may comprise a container, the container being provided with mounting means to engage a structure.

The foundation element may be provided with a bulkhead.

Said bulkhead may be provided with one of said mounting means.

The foundation element may be located in a trench. The trench may be prepared to receive the container. In particular a base may be provided in said trench to receive said foundation element.

The foundation element may be provided with filler. The filler may preferably be a dense material such as dry mix.

The foundation element may be provided with a duct to receive for example a power or communication cable.

The foundation element may be provided with a post anchor to receive a fence post.

The foundation element may comprise a stabiliser to engage an upwardly extending part of a structure disposed on said foundation.

Such a stabiliser provides an additional support for a structure where very high wind loads are expected.

According to a second aspect of the invention, we provide a foundation element comprising a container having one or more mounting means.

The foundation element may be provided with a bulkhead. Said bulkhead may be provided with one of said mounting means.

The foundation element may be provided with a duct to receive for example a power or communication cable.

The foundation element may be provided with a post anchor to receive a fence post.

The foundation element may comprise a stabiliser to engage an upwardly extending part of a structure disposed on said foundation.

According to a third aspect of the invention, we provide a method of preparing a foundation comprising the steps of preparing a trench, providing at least one foundation element according to the second aspect of the invention locating said foundation element in said trench, and filling said foundation element with filler.

According to a fourth aspect of the invention, we provide a structure having a foundation according to the first aspect of the invention.

The structure may comprise an aerial mast.

The structure may further comprise an equipment housing.

The aerial may extend upwardly from said equipment housing.

The invention will now be described by way of an example only with reference to the following drawings wherein;

Figure 1 shows a structure comprising an aerial mast located on a foundation embodying the first aspect of the present invention,

Figure 2 is a plan view of the structure and foundation of Figure 1,

Figure 3 is a view on enlarged scale, partly broken away of part of the structure and foundation of Figure 2,

Figure 4 is a section on line 4-4 of Figure 3,

Figure 5 is a perspective view of a foundation element embodying the second aspect of the present invention,

Figure 6 is a side view of an alternative embodiment of the structure and foundation of Figure 1 and

Figure 7 is partial plan view of the structure of Figure 6,

Figure 8 is a perspective view of an alternative embodiment of the foundation element of Figure 5,

Figure 9 is a perspective view of an alternative embodiment of the foundation element of Figure 5,

Figure 10 is a side view of the structure and foundation of Figure 1 provided with a fence, and

Figure 11 is a plan view of part of the structure and foundation of Figure 10.

As shown in Figures, a foundation embodying the first aspect of the present invention comprises a plurality of foundation elements 10, each embodying the second aspect of the invention. Mounted on these foundation elements 10 is a structure S, in the present example comprising an aerial mast 26 and equipment housing 27.

As best shown in Figure 5, each foundation element 10 comprises a container 11 having a base 12. Extending upwardly from the base 12 are side

walls 12a', 12a'' and end walls 12b', 12b''. The upper part of the container 11 is open. Attached to the upper edges of each of the side walls 12a', 12a'' is an outwardly extending lip 13. Extending transversely across the container is a bulkhead 14, and provided at the top of said bulkhead 14 is a bulkhead lip 15 which extends towards the end wall 12b''. Mounting means 16, in the present example apertures to receive a suitable connecting means, are provided on the lips 13 and bulkhead lip 15. The bulkhead 14 provides additional rigidity to the container 15. In one corner of the foundation element 10 is provided a post anchor 17, in the present example a square socket adapted to receive a fence post. The container is further provided with apertures in the end walls 12b', 12b'' and the bulkhead 14 which receive a longitudinally extending a duct 18 through which cables 19 may be passed for, for example a power connection or a communication connection as desired.

To provide a foundation a plurality of such foundation elements are provided, preferably arranged such that each corner of a structure S to be mounted on the foundation will engage a respective one of said foundation elements. A trench 20 is excavated to receive each foundation element 10, the bottom part of each trench being provided with a suitable base 21, for example concrete, compacted sand or other suitable material. The foundation element 10 is placed in the trench 20 such that it rests on the base 21, and is filled with a filler 22, for example dry mix or other dense material. A cable 19 may be passed through the duct 18 such that the free end of the cable 19 emerges beneath the position of the structure S. The remainder of the trench 20 may be filled with suitable infill material 23.

The structure S may then be located on the foundation element as appropriate. For example, as shown in Figure 3, a base 24 of the structure S may be mounted on the foundation elements 10 such that connection means 25 comprising moment-conveying connection means engage the mounting means

16 of the foundation element 10. Preferably, each foundation element 10 is located below a corner of the structure S such that the sides of the structure S are at an angle of  $45^{\circ}$  to the bulkhead 15 so that the structure S is attached to the three mounting means 16 of each foundation element 10 by connector means 25 as shown. The structure S may be placed on the structure base 24 and attached thereto once the base 24 has been mounted on the foundation elements 10. Equipment located within the structure S may be connected to, for example, the communication, power and other cables 19.

Alternatively, the structure S may be provided as a single prefabricated unit and may be attached directly to the foundation elements 10 without the intermediate step of mounting a base on the elements 10 and then connecting the structure to the base.

In the present example, the structure S comprises an aerial mast 26 and equipment housing 27, although the structure may comprise any other desired parts as appropriate.

Where it is desired to provide a separate housing outside the structure S, for example a meter cabinet, an alternative embodiment of the foundation element 10 may be provided as shown in Figures 6 to 8. As shown in Figure 8, the foundation element 10 is provided with two ducts having a first part 28a, 29a and an upwardly extending second part, 28b, 29b respectively which extends upwardly of the foundation element 10. The foundation element 10 is provided with apertures in the end walls 12b', 12b'', and the bulkhead 14 in like manner to the foundation element of Figure 5. The duct part 28a extends longitudinally inwardly of end wall 12b', while the duct part 29a extends longitudinally inwardly of end wall 12b'' and passes through bulkhead 14. The upwardly extending second parts 28b, 29b are disposed generally parallel and adjacent to one another. The foundation element 10 is also provided with a pair of diagonal support strips 30.

As shown in Figures 7 and 8, a cabinet 31 may be placed on said foundation element 10 attached to said support strips 30 over said upwardly extending second parts 28b, 29b. The equipment in the cabinet 31, for example a meter, may be connected to equipment inside the structure S via the second part 29b, and may be connected to an external connection via the second part 28b. Such a foundation element 10 is provided with mounting means 16 in like manner to the foundation element 10 of Figure 5 and may be filled with filler in like manner.

When a foundation is attached to said plurality of foundation elements 10, said foundation elements 10 having been installed and filled with filler, the foundation is sufficiently securely mounted to resist wind loading of the structure.

Where relatively high wind loading of the structure may be expected, one or more of said foundation elements 10 may be provided with an additional support 32 as shown in Figure 9. The support 32 extends upwardly from an end wall 12b' of the foundation element 10 in such a way as to engage an upwardly extending part of a structure S mounted on said foundation element 10. Such an additional support 32 will provide an additional resistance to wind turning moment on the structure S.

It may be desirable that any such structure S may be fenced off, for reasons of security. As shown in Figures 10 and 11, fence posts 33 may be located in each of the post anchors 17 and a fence 34 connected therebetween.

Although the container 11 is shown as open at the top and bottom, it will be apparent that the container 11 may be provided with a complete or partial base and/or a complete or partial top as desired. Although the walls of the container 11 are shown as generally planar, they may be provided with inwardly directed projections to key the container 11 to the filler 22. Parts of the container 11, for example the lips 13, may be reinforced as desired. Suitable keels (not shown) may be provided to anchor the container 11 to the

ground if required. If desired, the base 21 of the trench 20 may be omitted. One or more of the foundation elements 11 may even be placed directly on the ground surface. The filler 22 may comprise pre-mixed concrete which will go off as a result of the dampness in the soil or the environment. The bulkhead 104 may be omitted as desired, particularly if cross-braces or other stiffening means are provided.

The present invention thus permits the relatively quick and straightforward establishment of a foundation and erection of a structure, with significantly lower time and equipment requirements than providing a conventional poured concrete foundation.

In the present specification "comprise" means "includes or consists of" and "comprising" means "including or consisting of".

The features disclosed in the foregoing description, or the following claims, or the accompanying drawings, expressed in their specific forms or in terms of a means for performing the disclosed function, or a method or process for attaining the disclosed result, as appropriate, may, separately, or in any combination of such features, be utilised for realising the invention in diverse forms thereof.



**CLAIMS**

- 1      A foundation comprising at least one prefabricated foundation element.
2.     A foundation according to Claim 1 wherein said foundation element comprises a container, the container being provided with mounting means to engage a structure.
3.     A foundation according to Claim 2 wherein the foundation element is provided with a bulkhead.
4.     A foundation according to Claim 3 wherein said bulkhead is provided with said mounting means.
5.     A foundation according to any one of the preceding claims wherein said foundation element is located in a trench.
6.     A foundation according to Claim 5 wherein a base is provided in said trench to receive said foundation element.
7.     A foundation according to any one of the preceding claims wherein the foundation element is provided with filler.
8.     A foundation according to Claim 7 wherein the filler comprises a dense material such as dry mix.
9.     A foundation according to any one of the preceding claims wherein the foundation element is provided with a duct to receive a cable.

10. A foundation according to any one of the preceding claims wherein the foundation element is provided with a post anchor to receive a fence post.

11. A foundation according to any one of the preceding claims wherein the foundation element comprises a stabiliser to engage an upwardly extending part of a structure disposed on said foundation.

12. A foundation substantially as described herein with reference to the accompanying drawings.

13. A foundation element comprising a container having mounting means to engage a structure.

14. A foundation element according to Claim 13 wherein the foundation element is provided with a bulkhead.

15. A foundation element according to Claim 14 wherein said bulkhead is provided with one of said mounting means.

16. A foundation element according to any one of Claims 13 to 15 wherein the foundation element is provided with a duct to receive a cable.

17. A foundation element according to any one of Claims 13 to 16 wherein the foundation element is provided with a post anchor to receive a fence post.

18. A foundation element according to any one of Claims 13 to 17 wherein the container comprises a stabiliser to engage an upwardly extending part of a structure.

19. A foundation element substantially as described herein with reference to the accompanying drawings.

20. A method of preparing a foundation comprising the steps of preparing a trench, providing at least one foundation element according to any one of Claims 13 to 19 locating said foundation element in said trench, and filling said foundation element with filler.

21. A structure having a foundation according to any one of Claims 1 to 11.

22. A structure according to Claim 21 wherein the structure comprises an aerial mast.

23. A structure according to Claim 22 wherein the structure further comprises an equipment housing.

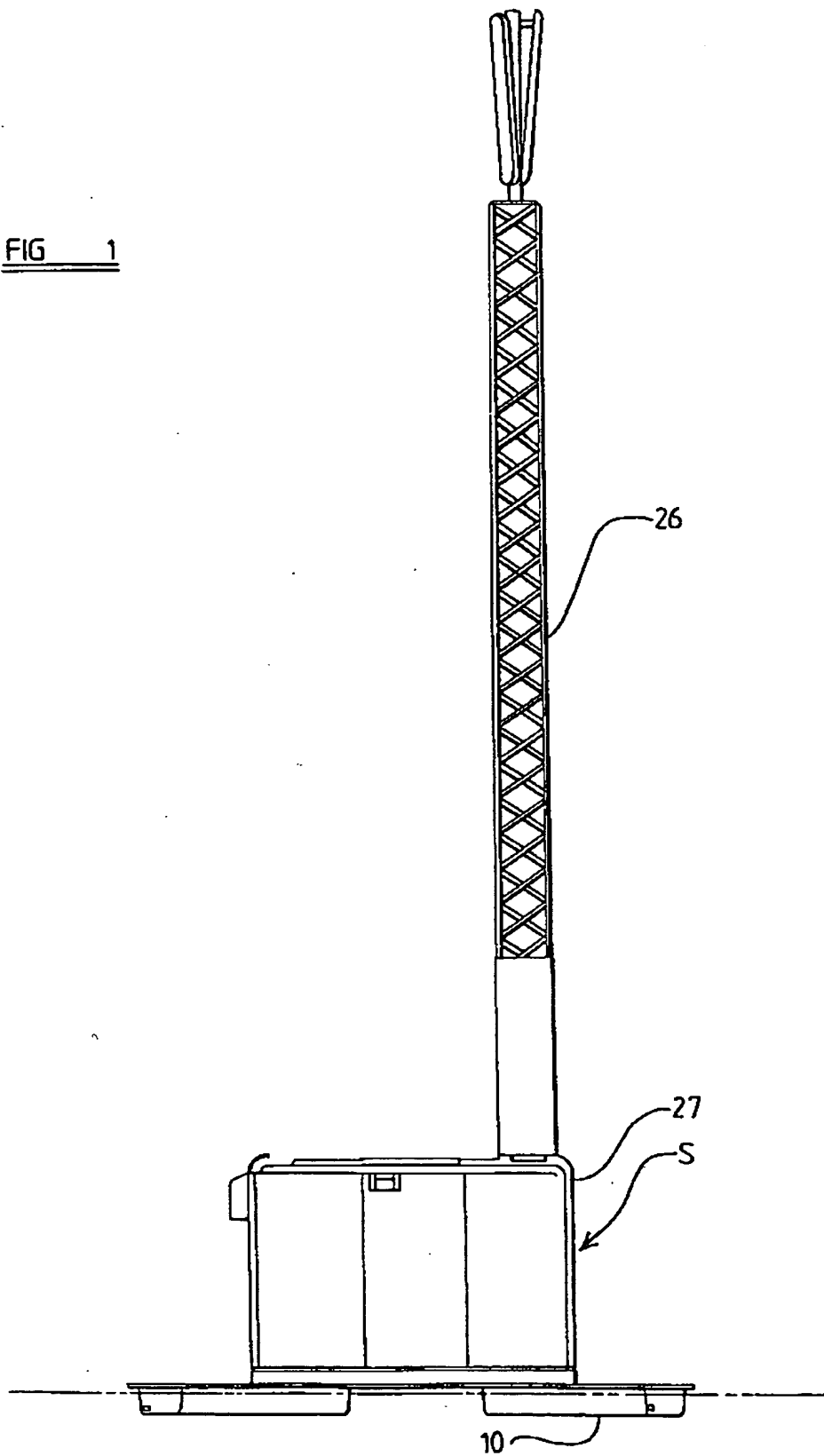
24. A structure according to Claim 23 wherein the aerial extends upwardly from said housing.

25. A structure substantially as described herein with reference to the accompanying drawings.

26. Any novel feature or novel combination of features described herein and/or in the accompanying drawings.

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FIG 1



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FIG 2

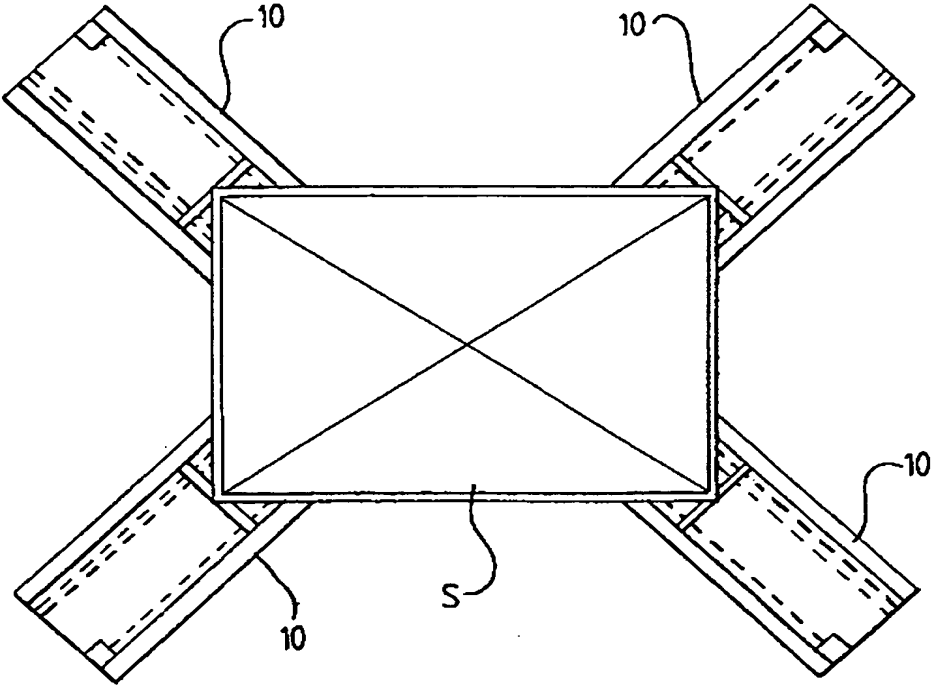
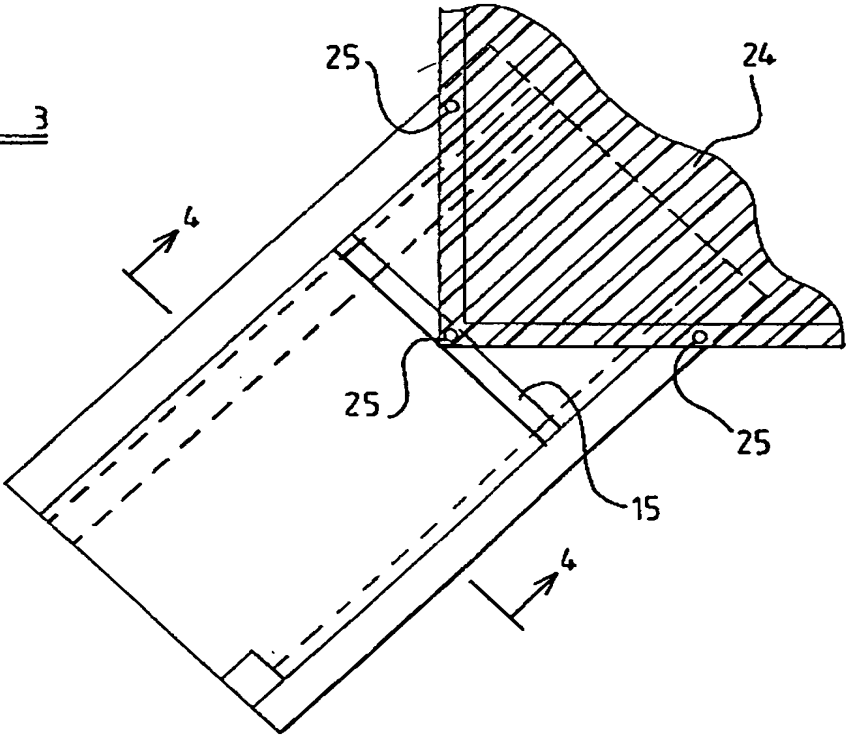


FIG 3



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FIG 4

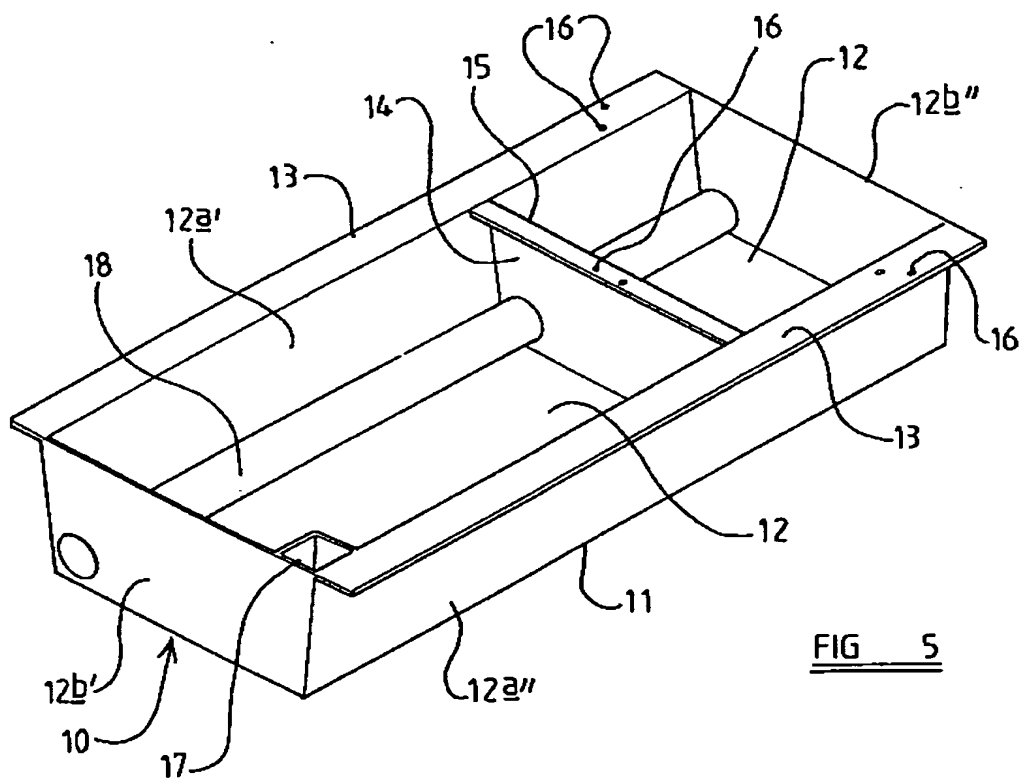
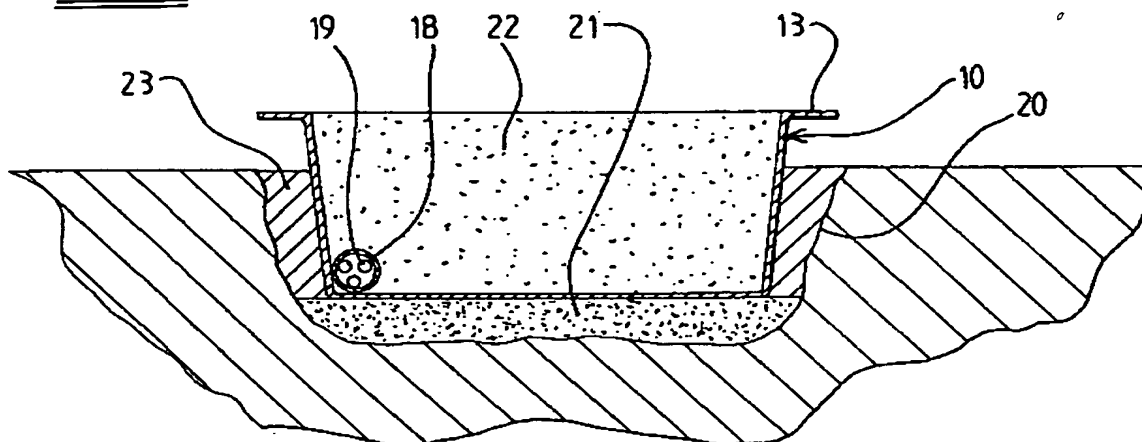


FIG 5

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FIG 6

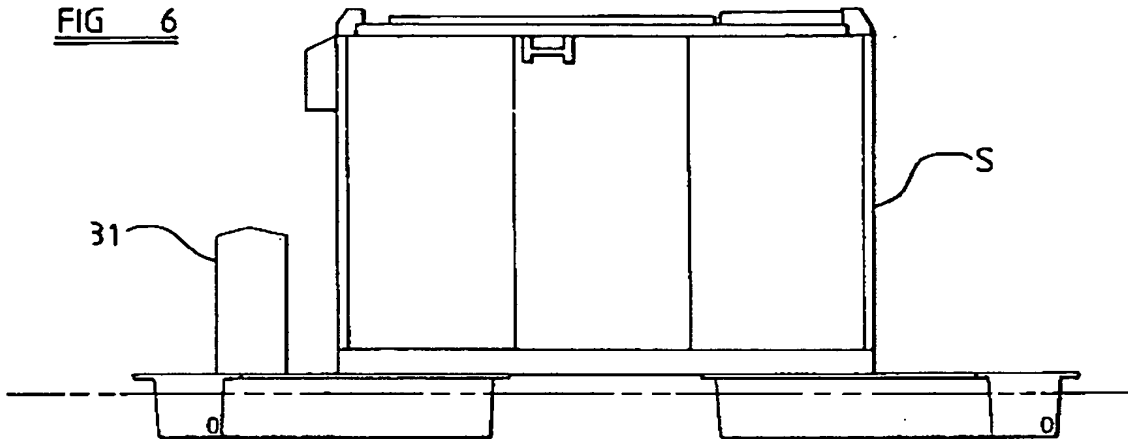


FIG 7

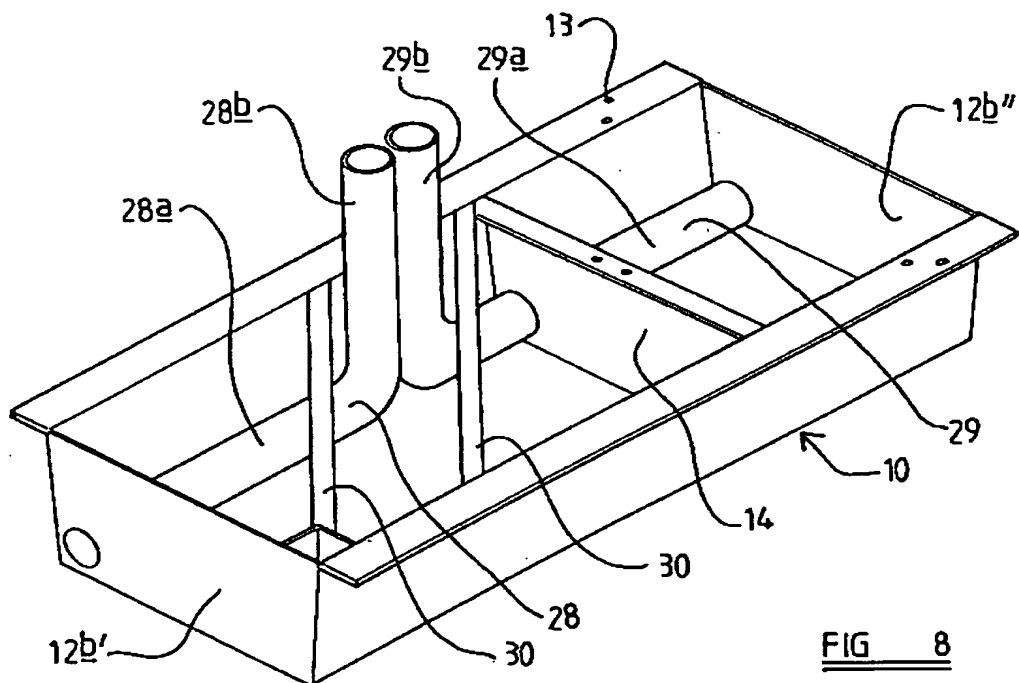
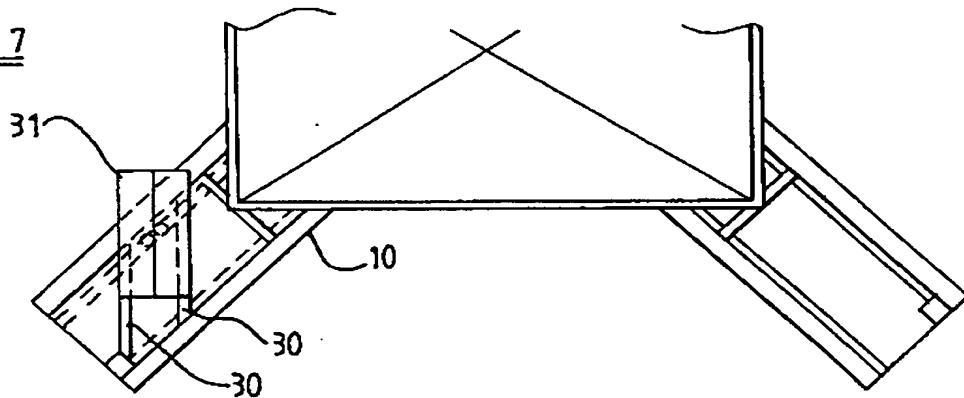


FIG 8

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FIG 9

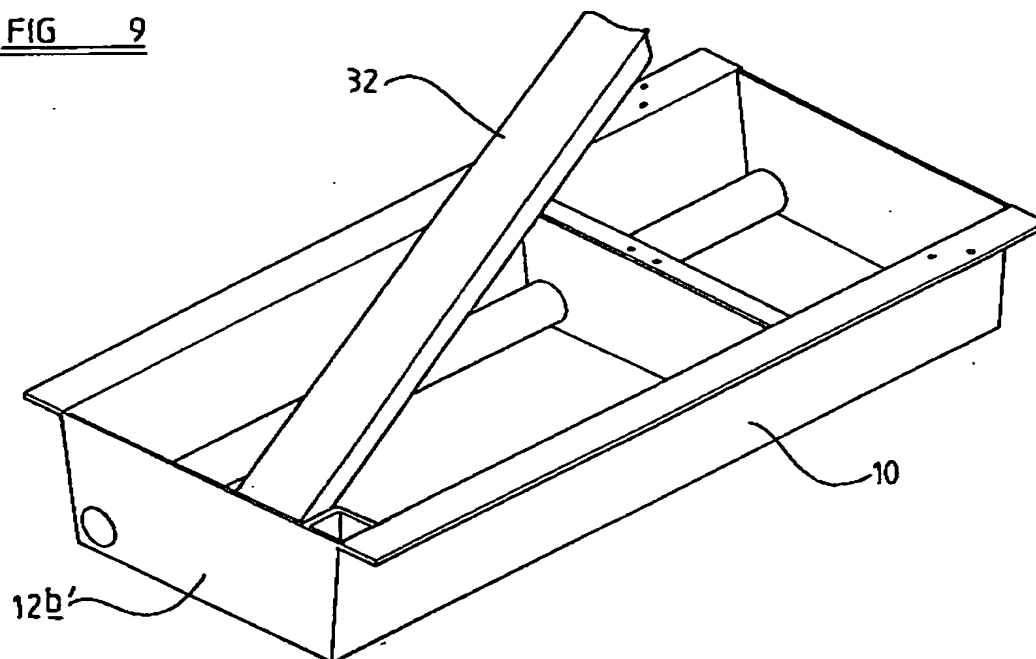


FIG 10

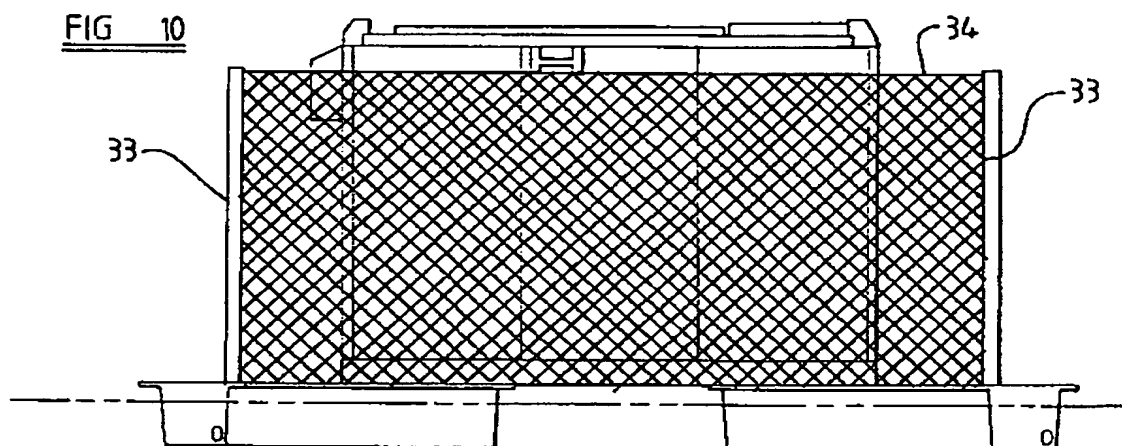
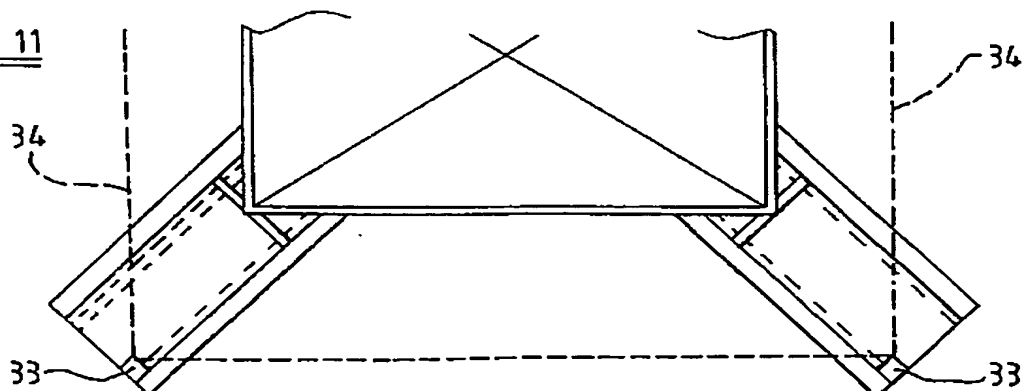


FIG 11





# INTERNATIONAL SEARCH REPORT

International Application No.  
PCT/GB 00/04846

**A. CLASSIFICATION OF SUBJECT MATTER**  
IPC 7 E02D27/01 E04H5/02 H01Q1/12

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)  
IPC 7 E02D E04H H01Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the International search (name of data base and, where practical, search terms used)

EPO-Internal, PAJ

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

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| Y          | page 1, line 12 -page 3, line 2  | 6, 9, 16                       |
| X          | NL 1 009 917 C (KONINKLIJKE KPN N.V.)<br>5 November 1998 (1998-11-05)              | 1-3, 11,<br>13, 14,<br>21-24   |
|            | page 1, line 30 -page 2, line 8; figures<br>1, 2                                   |                                |
| X          | US 2 036 047 A (HILL)<br>31 March 1936 (1936-03-31)                                | 1-4,<br>13-15                  |
|            | page 1, right-hand column, line 4-30;<br>figures 1, 2                              |                                |
|            | ---<br>-/--  |                                |

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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Date of the actual completion of the international search

9 April 2001

Date of mailing of the international search report

18/04/2001

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# INTERNATIONAL SEARCH REPORT

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

| Category * | Citation of document, with indication, where appropriate, of the relevant passages  | Relevant to claim No. |
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| A          | 6 October 1998 (1998-10-06)<br>figures 1,2,9  | 10,17                 |
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Information on patent family members

International Application No

PCT/GB 00/04846

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